

## CLAIMS

[0058] What is claimed is:

1. An apparatus comprising a controller to selectively provide a data-frame of a signal to be transmitted to either a frequency-multiplexing modem or a spatial-multiplexing modem based on a predetermined criterion.
2. The apparatus of claim 1, wherein said predetermined criterion comprises a comparison between a channel quality value and a predetermined reference quality value.
3. The apparatus of claim 2, wherein said reference quality value comprises a minimum quality value.
4. The apparatus of claim 2, wherein said channel quality value is related to one or more data frames previously received or transmitted by the apparatus.
5. The apparatus of claim 2, wherein said channel quality value corresponds to a channel estimation related to said spatial multiplexing modem.
6. The apparatus of claim 1, wherein said frequency-multiplexing modem comprises a multi-channel modem.
7. The apparatus of claim 6, wherein said multi-channel modem comprises:
  - a plurality of channel access control modules able to be assigned to a plurality of individual frequency channels, respectively; and
  - a plurality of single-input-single-output encoding modules able to modulate data provided by said plurality of channel access control modules, respectively.
8. The apparatus of claim 7, wherein said multi-channel modem further comprises a plurality of single-input-single-output decoding modules associated with said plurality of access control modules, respectively, and able to demodulate data received from a plurality of radio frequency paths, respectively.
9. The apparatus of claim 8, wherein said multi-channel modem further comprises a channel selection module to selectively control the assignment of said plurality of channel access control modules to said plurality of individual frequency channels.

10. The apparatus of claim 1, wherein said spatial-multiplexing modem comprises a space-time coding modem.

11. The apparatus of claim 10, wherein said space-time coding modem comprises:

a multiple-input-multiple-output channel access control module able to multiplex the data-frame of said signal to be transmitted into a plurality of parallel sequences; and

a multiple-input-multiple-output encoding module able to encode said parallel sequences and transmit the encoded sequences via a plurality of radio frequency paths.

12. The apparatus of claim 11, wherein said space-time coding modem further comprises a multi-input-multi-output decoding module to decode a plurality of received parallel data sequences from said plurality of paths.

13. A wireless device comprising:

two or more omni-directional antennas able to send and receive signals; and

a controller to selectively provide a data-frame of a signal to be transmitted via one or more of said antennas to either a frequency-multiplexing modem or a spatial-multiplexing modem based on a predetermined criterion.

14. The wireless device of claim 13, wherein said predetermined criterion comprises a comparison between a channel quality value and a predetermined reference quality value.

15. The wireless device of claim 14, wherein said reference quality value comprises a minimum quality value.

16. The wireless device of claim 13, wherein said frequency-multiplexing modem comprises a multi-channel modem.

17. The wireless device of claim 16, wherein said multi-channel modem comprises:

a plurality of channel access control modules able to be assigned to a plurality of individual frequency channels, respectively; and

a plurality of single-input-single-output encoding modules able to modulate data provided by said plurality of channel access control modules, respectively.

18. The wireless device of claim 13, wherein said spatial-multiplexing modem comprises a space-time coding modem.

19. The wireless device of claim 18, wherein said space-time coding modem comprises:

a multiple-input-multiple-output channel access control module able to multiplex the data-frame of said signal to be transmitted into a plurality of parallel sequences; and

a multiple-input-multiple-output encoding module able to encode said parallel sequences and transmit the encoded sequences via a plurality of radio frequency paths.

20. A method comprising:

selectively modulating a data frame of a signal using either a frequency-multiplexing modulation method or a spatial-multiplexing modulation method based on a predetermined criterion.

21. The method of claim 20, wherein selectively modulating comprises evaluating a channel quality value corresponding to a channel estimation related to a predetermined modulation method of said spatial-multiplexing modulation method and said frequency-multiplexing modulation method.

22. The method of claim 21 wherein said predetermined modulation method comprises said spatial-multiplexing modulation method.

23. The method of claim 21, wherein selectively modulating further comprises comparing said channel quality value with a predetermined reference quality value.

24. The method of claim 23, wherein said reference quality value comprises a minimum quality value.

25. The method of claim 23, wherein selectively modulating further comprises using said predetermined modulation method if said channel quality value is at least equal to said predetermined reference quality value.

26. The method of claim 25 comprising repeating said selectively modulating.

27. The method of claim 26 comprising periodically repeating said selectively modulating.

28. A program storage device having instructions readable by a machine that when executed by the machine result in:

selectively modulating a data frame of a signal using either a frequency-multiplexing modulation method or a spatial-multiplexing modulation method based on a predetermined criterion.

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29. The program storage device of claim 28, wherein the instructions resulting in selectively modulating result in evaluating a channel quality value corresponding to a channel estimation related to a predetermined modulation method of said spatial-multiplexing modulation method and said frequency-multiplexing modulation method.

30. The program storage device of claim 29, wherein said predetermined modulation method comprises said spatial-multiplexing modulation method.

31. The program storage device of claim 29, wherein the instructions resulting in selectively modulating further result in comparing said channel quality value with a predetermined reference quality value.

32. The program storage device of claim 31, wherein the instructions resulting in selectively modulating further result in using said predetermined modulation method if said channel quality value is at least equal to said predetermined reference quality value.

33. The program storage device of claim 32, wherein said instructions result in repeating said selectively modulating.

34. A system comprising:

a first communication device comprising:

two or more antennas to transmit and receive signals; and

a controller to selectively provide a data-frame of a signal to be transmitted via one or more of said antennas to either a frequency-

multiplexing modem or a spatial-multiplexing modem based on a predetermined criterion.; and

a second communication device able to receive one or more signals transmitted by said first device.

35. The system of claim 34, wherein said predetermined criterion comprises a comparison between a channel quality value and a predetermined reference quality value.

36. The system of claim 35, wherein said reference quality value comprises a minimum quality value.

37. The system of claim 34, wherein said frequency-multiplexing modem comprises a multi-channel modem.

38. The system of claim 37, wherein said multi-channel modem comprises:

a plurality of channel access control modules able to be assigned to a plurality of individual frequency channels, respectively; and

a plurality of single-input-single-output encoding modules able to modulate data provided by said plurality of channel access control modules, respectively.

39. The system of claim 34, wherein said spatial-multiplexing modem comprises a space-time coding modem.

40. The system of claim 39, wherein said space-time coding modem comprises:

a multiple-input-multiple-output channel access control module able to multiplex the data-frame of said signal to be transmitted into a plurality of parallel sequences; and

a multiple-input-multiple-output encoding module able to encode said parallel sequences and transmit the encoded sequences via a plurality of radio frequency paths.